

**School of Electronics and Communication Engineering**

**Second Year B. Tech. (ECE)**

**Hardware/Software Tools for Electronics Engineering**

**Course Code: ECE208A**

**Home Safers**

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### **Abstract:**

To ensure the safety of the belongings to be kept at a place, a security system is required which alerts the people around that place if intruder is detected. So, this security system consists of password various features like password verification, buzzer, photo clicking mechanism and also sending the message to the user with the help of IOT. Using the arduino and basic components a security system has been designed by the group. It includes password verification and the buzzer system. The next version of this security system would be also sending messages to user by the use of GSM module with the help of IOT.

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## **INTRODUCTION**

This is a security alarm system that validates the password input from the user and then allows the user to enter the place.

### **AIM:**

The aim of the project is to ensure safety in one's own house and to avoid the threat of any crime.

### **Basic Scope and Background:**

As we advance in technology people are becoming more dependent on it and technology is begin used for solving daily life task. This will ensure that an unknown entity won't enter your premises. This system is not only useful at home but also for offices, schools and colleges where in only the employees/students belonging to that particular institution will be able to enter the premises.

### **Objective**

To learn how to take and interface input from the keypad.

To interface and make use of the lcd display.

To learn how to use the various digital and analog pins of the Arduino.

To create a security system by making use of the above techniques learned.

### **Literature Survey:**

Similar kind of security system is designed and found on the internet which uses the PIR sensor and the ultrasonic sensor to detect the intruder. But it doesn't have any password verification mechanism. It just senses the motion and distance of the intruder and if the distance is less than the minimum distance coded in the Arduino, the alarm rings and a message is sent to the owner and the IP cam turns on and captures the image of the intruder and uploads it. This type of security system can be used if you have a valuable belonging and want to keep it safe at your home/ office with trusted security.

### System Specifications:

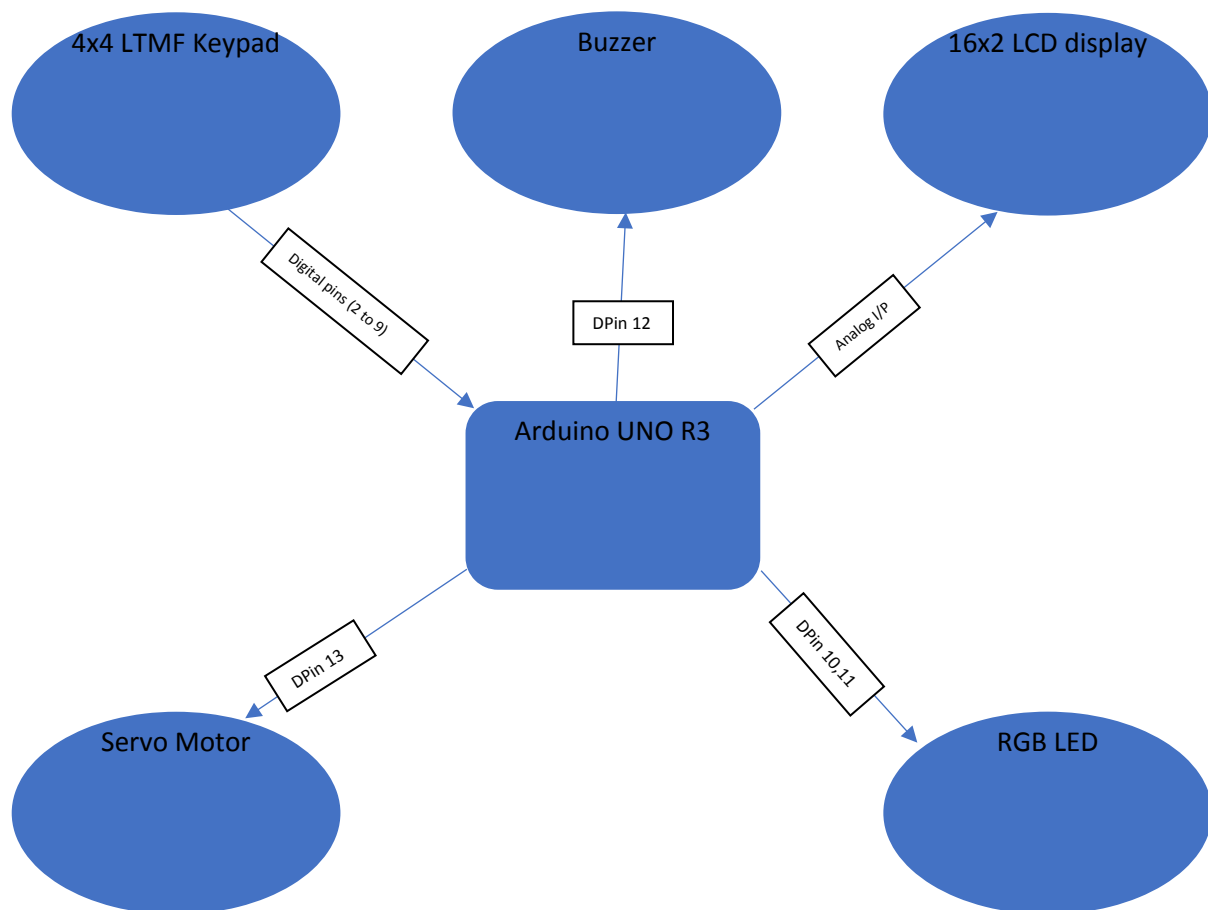
Using the LCD display for visual alert for entered password.

Making use of Arduino code for verification and validation of the entered password by the user.

Use of buzzer and RGB led for indication in case of LCD failure.

Use of servo motor to open the door and close.

### System Block Diagram



### Description:

Arduino digital pins are connected to the keypad, RGB led, buzzer while the analog pins are connected to the 16x2 lcd display. Keypad is initialized and the RGB led is turned red. Original password is stored in string password='4576'.

Empty string passin is declared to store user input.

User input is taken and stored in passin.

Passin is compared with password.

If they match, then the RGB led is turned green.

Display shows (password correct. Door open. Please go inside.);

Delay of 5secs in order to enter.

RGB led is turned red again.

Display shows (door closed);

If password and password don't match then the buzzer is set on and RGB led is turned red.

Display shows (wrong password);

Again, the whole process from start is repeated in a loop.

The PCB layout has been made on EasyEDA software.

The simulated model is made on Autodesk Tinkercad software.

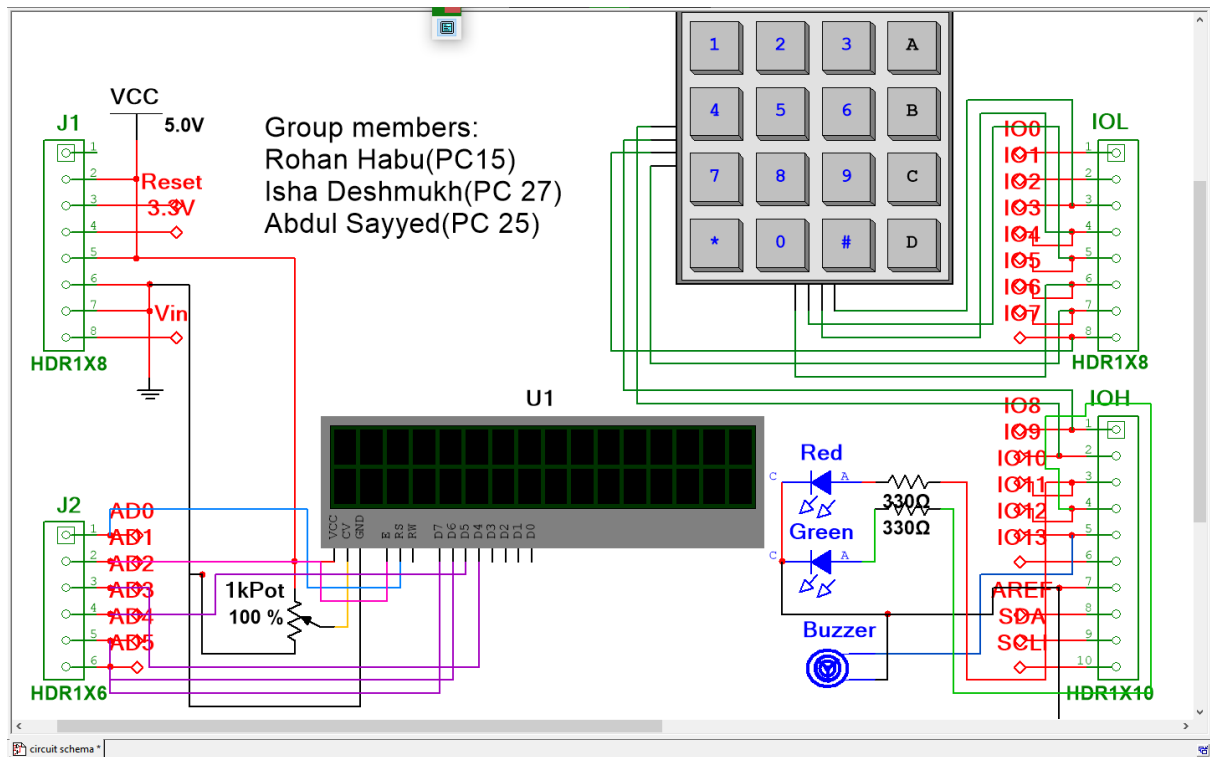
The circuit layout is made on multisim.

### **Components and Devices:**

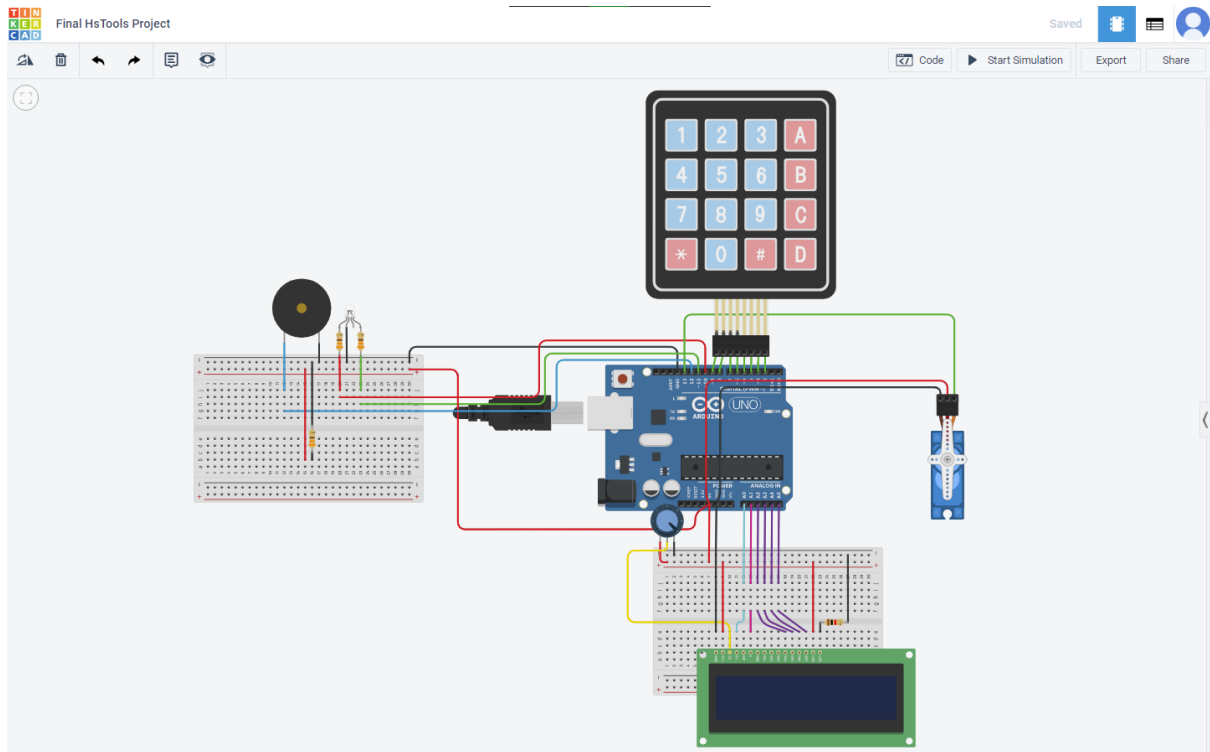
All the components used in implementing the program are given below:

1. Keypad 4x4
2. LCD Display 16x2
3. Arduino uno R3
4. Potentiometer
5. Resistor
6. RGB Led
7. Buzzer
8. Servo Motor
9. Breadboard

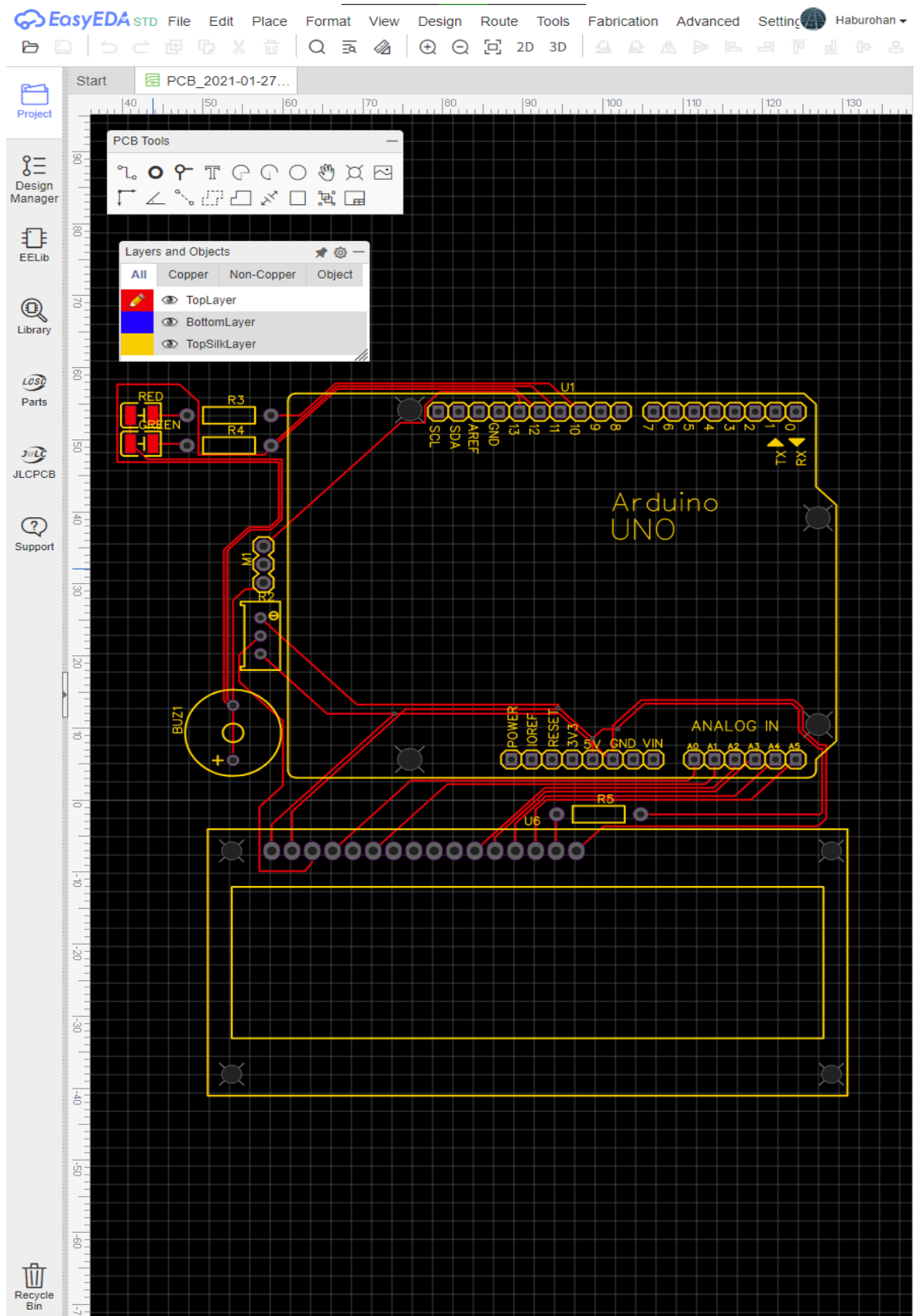
### **Circuit Diagram:**



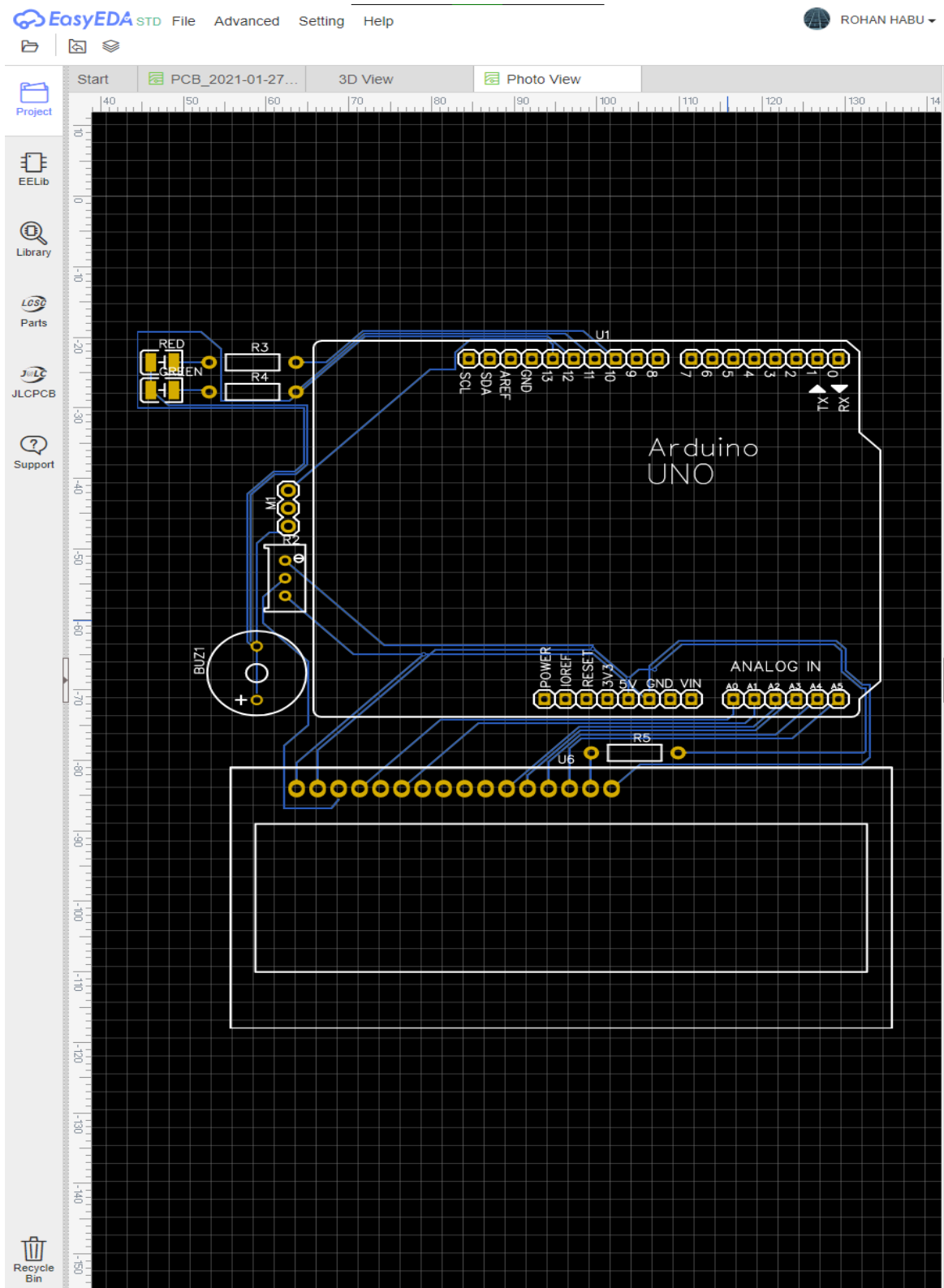
### Circuit Simulation:



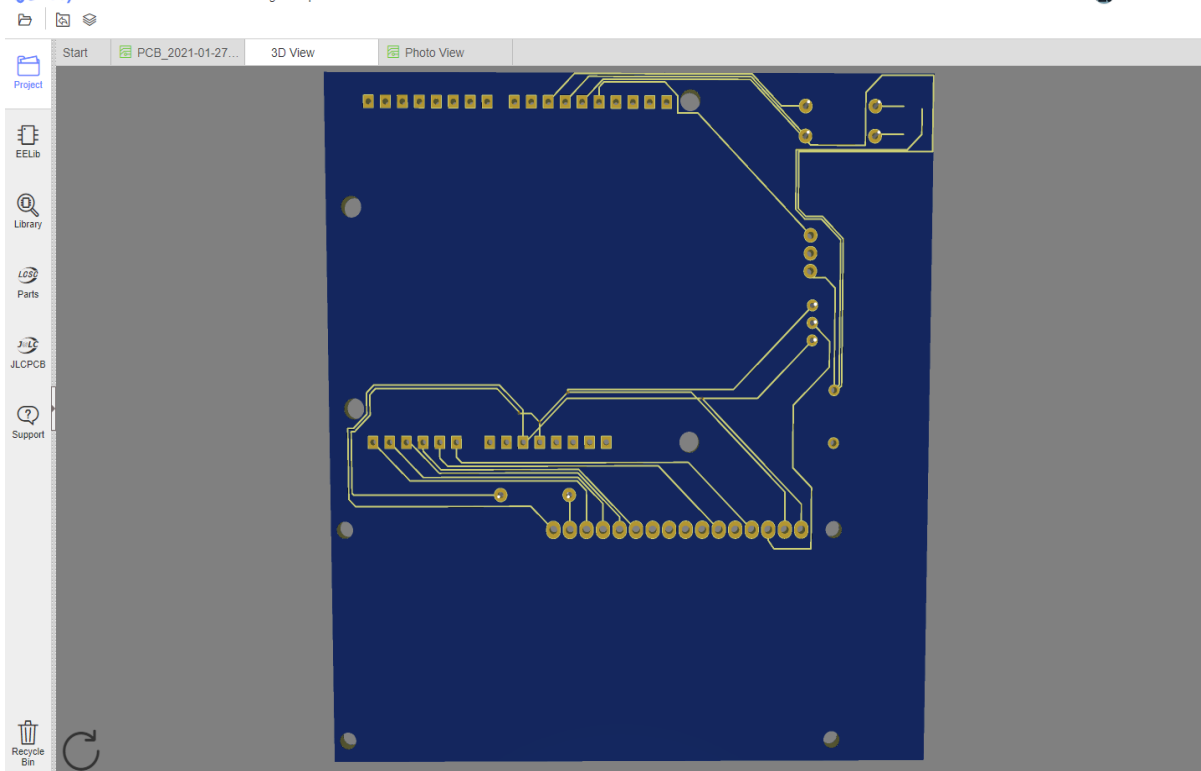
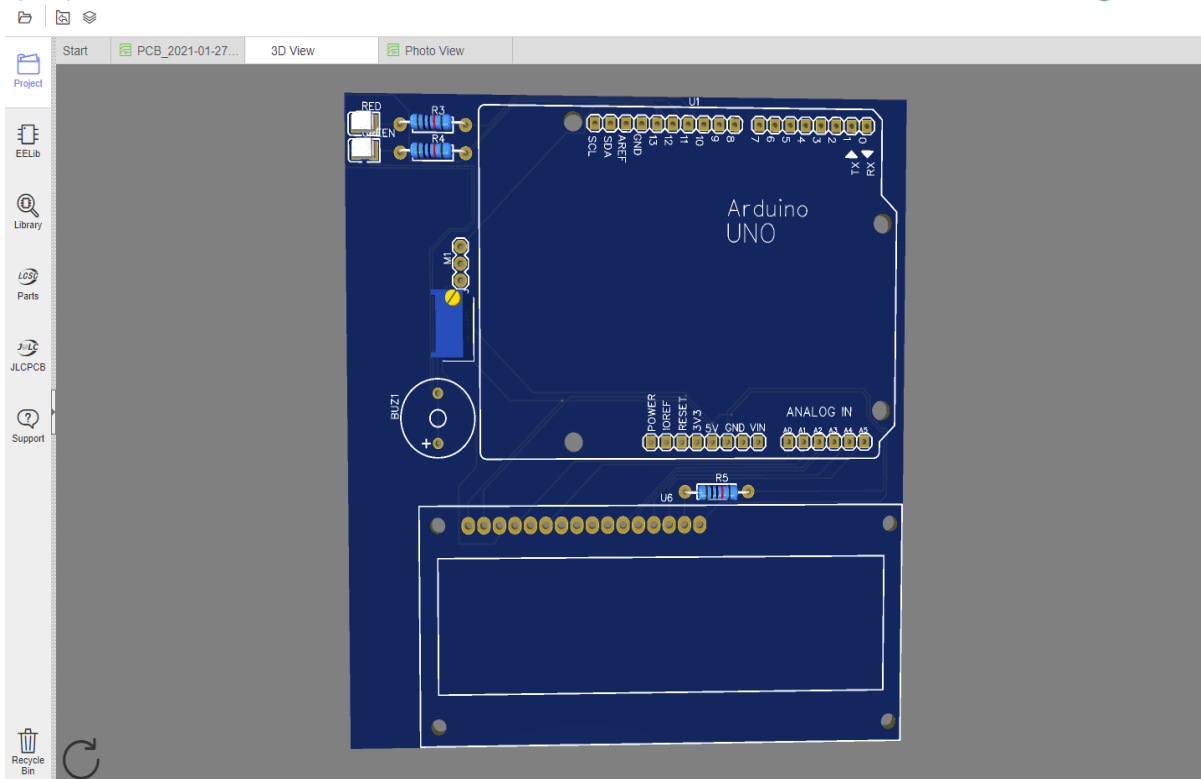
## PCB Layout:



## Software Design:







### **ALGORITHM:**

**Step 1:** Start

**Step 2:** Declare the constants for ports to be used and set RGB led to red colour.

**Step 3** Initialize the keypad.

**Step 4:** Set the password to '4756'.

**Step 5:** Take user input and store it in new empty string.

**Step 6:** Compare the stored value password with the user input string.

**Step 7:** If correct. {

    Print (password correct. Door open. Please go inside.)

    Turn RGB led to green.

    Rotate servo to 90° anticlockwise.

    Delay(5sec);

    Rotate servo to 0°.

    Print (door closed);

    Turn RGB led to red.

    }

Else {

    print (wrong password);

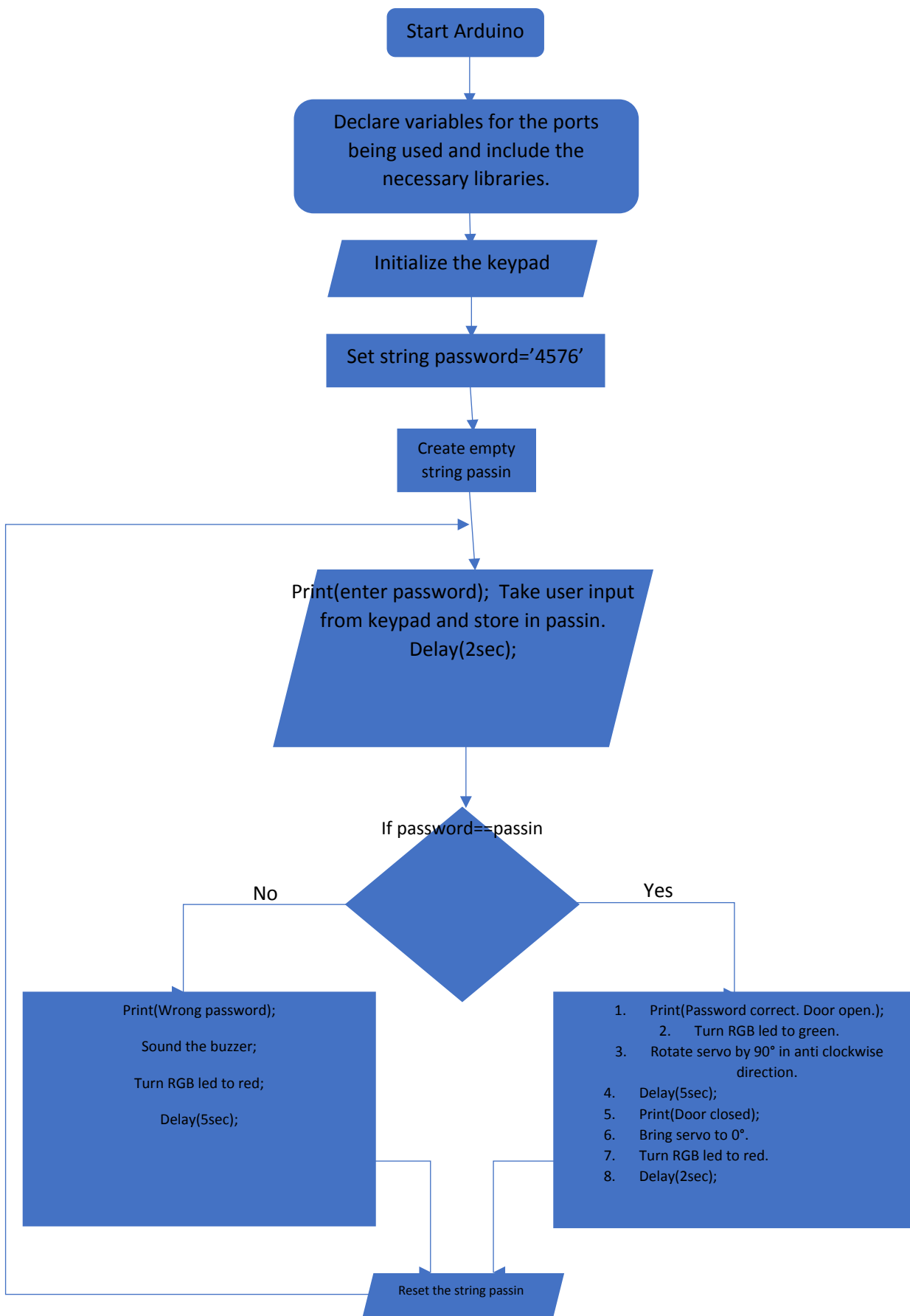
    Sound the buzzer.

    Turn RGB led to red colour.

    }

**Step 8:** Go to Step 5;

### Flowchart:



### Code:

```
#include <LiquidCrystal.h>

#include <Keypad.h>

#include<Servo.h>

//declaring variable ser of the type servo to control servo motor
Servo ser;

//declaring the rows and columns for keypad
const byte row= 4;
const byte col= 4;

//declaring the red, green and buzzer ports for indication
const int redLed= 10;
const int greenLed= 11;
const int piezo= 12;

//initialization of the keypad
char numPad[row][col] = {
  {'1', '2', '3'}, {'4', '5', '6'},
  {'7', '8', '9'}, {'*', '0', '#'}
};

//setting the ports for pins of keypad
byte rowPin[row] = {9, 8, 7, 6};
byte colPin[col] = {5, 4, 3, 2};

//declaring string to store the password for access
String password = "4576";

//declaring string to take I/P from user
String passin = "";

//using the makeKeymap function to map keypad keys
Keypad cKeypad = Keypad(makeKeymap(numPad), rowPin, colPin, row, col);
LiquidCrystal lcd(A0,A1,A2,A3,A4,A5);

void setup()
{
```

```
//initializing the pinMode of the declared variables

pinMode(redLed, OUTPUT);
pinMode(greenLed, OUTPUT);
pinMode(piezo, OUTPUT);
digitalWrite(redLed,HIGH);

//begining the serial communication of arduino with
//serial monitor with baud rate of 9600bytes/sec
Serial.begin(9600);

lcd.begin(16,2);
lcd.setCursor(0,0);
lcd.setCursor(0,0);
lcd.print("Made by:");
lcd.setCursor(0,1);
lcd.print("Home Safers");
delay(1000);
Serial.println("HSTools group project");
lcd.clear();
lcd.setCursor(0,0);
lcd.print("HSTools group");
lcd.setCursor(0,1);
lcd.print("project");
delay(2000);
lcd.clear();
lcd.setCursor(0,0);
lcd.print("Group members:");
Serial.println("Group members:");
delay(1500);
lcd.clear();
lcd.setCursor(0,0);
lcd.print("Rohan Habu");
lcd.setCursor(0,1);
```

```

lcd.print("PC 15");
Serial.println("Rohan Habu\nPC 15");
delay(2000);
lcd.clear();
lcd.setCursor(0,0);
lcd.print("Isha Deshmukh");
lcd.setCursor(0,1);
lcd.print("PC 27");
Serial.println("Isha Deshmukh\nPC27");
delay(2000);
lcd.clear();
lcd.setCursor(0,0);
lcd.print("Abdul Sayyed");
lcd.setCursor(0,1);
lcd.print("PC 25");
Serial.println("Abdul Sayyed\nPC 25");
delay(2000);
//printing a message on the serial monitor
Serial.println("Enter password: ");
lcd.clear();
lcd.print("Enter password:");
lcd.setCursor(0,1);
ser.attach(13);
}

void loop()
{
ser.write(0);
//lcd.setCursor(0,0);
//getting the user input in type of character
char cKey= cKeypad.getKey();

```

```

//checking the condition of each entered I/P by the user
if (cKey){
  if(passin.length() < password.length()) {
    //printing * in order to assure the working of keypad.
    Serial.print("*");
    lcd.print("*");
    passin += cKey;
  }
}

//comparing the length of user I/P and the password
if(passin.length() == password.length()) {
  delay(1500);

  //comparing the user I/P and the password
  if(password == passin) {
    Serial.println("Password correct");
    lcd.clear();
    lcd.setCursor(0,0);
    lcd.print("Password correct");
    digitalWrite(redLed,LOW);
    digitalWrite(greenLed,HIGH);
    delay(1000);
    Serial.println("Door open...");
    lcd.clear();
    lcd.setCursor(0,0);
    lcd.print("Door open...");
    ser.write(90);
    delay(2000);

    //Generating a tone of frequency 500Hz at piezo(12) pin
    tone(piezo,500);
    delay(100);

    //stopping the tone at pin 12

```

```
noTone(piezo);
delay(500);
Serial.println("Please go inside...");
lcd.clear();
lcd.setCursor(0,0);
lcd.print("Please go inside");
delay(2000);
Serial.println("Door closed...");
lcd.clear();
lcd.setCursor(0,0);
lcd.print("Door closed...");
ser.write(0);
delay(1000);
lcd.clear();
} else {
//this else part will be executed if the password entered
//is not correct.
Serial.println("Wrong Password");
lcd.clear();
lcd.setCursor(0,0);
lcd.print("Wrong password..");
lcd.setCursor(0,1);
lcd.print("Please try again");
digitalWrite(redLed,HIGH);
digitalWrite(greenLed,LOW);
tone(piezo,1000);
delay(800);
tone(piezo,1000);
delay(800);
noTone(piezo);
delay(2000);
```



```
}  
  
//generating delay of 1500usec  
delay(1500);  
  
if(passin.length()<password.length()){  
Serial.println("\nIncomplete password...");  
lcd.clear();  
lcd.setCursor(0,0);  
lcd.print("Incomplete");  
lcd.setCursor(0,1);  
lcd.print("password");  
}
```

```
  
delay(2000);  
  
if(passin.length()==NULL){  
Serial.println("No password entered...");  
lcd.clear();  
lcd.setCursor(0,0);  
lcd.print("No password");  
lcd.setCursor(0,1);  
lcd.print("entered...");  
}
```

```
  
delay(2000);  
  
//flashing the user I/P string  
passin = "";  
Serial.println("Enter Password: ");  
lcd.clear();  
lcd.setCursor(0,0);  
lcd.print("Enter password:");  
lcd.setCursor(0,1);  
digitalWrite(redLed,HIGH);  
digitalWrite(greenLed,LOW);
```

```
}  
  
}
```

### **Testing and Debugging:**

First enter correct password and check whether all the code is executing in the desired manner. Next enter the wrong password and check whether the motor rotates or not even after the wrong input password and verify the code again.

### **Result:**

Thus, a security system has been implemented by making use of the arduino uno r3 and other components like lcd 16x2 display, buzzer, RGB led, etc.

### **Conclusion:**

Thus we have implemented and Arduino Circuit which ensures you will stay at your home safely and only the ones knowing your security code can enter your premises without your permission.

### **Future scope and applications:**

- This system can be implemented in every private place to make it secure.
- It may include schools, colleges and offices.
- Also, a home systems which updates each official on his/her phone with the turning on of the alarm.

### **References:**

Arduino.cc

Circuits-lab.com

Electronicsforyou.com

Data sheets

<https://components101.com/16x2-lcd-pinout-datasheet>

<https://components101.com/misc/4x4-keypad-module-pinout-configuration-features-datasheet>